United States Department of Agriculture
Agricultural Research Administration
Bureau of Entomology and Plant Quarantine

AN APPARATUS TO FACILITATE DDT EXTRACTION FROM SOIL SAMPLES

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The use of DDT against white-fringed beetles (Graphognathus spp.) is now of paramount importance, both as foliage applications to kill adults and as a larvicide in soil. For both these uses the development of formulas, dosages, and other pertinent relations involves numerous and repeated series of chemical analyses of foliage and soil samples to recover the DDT present. In either case a solvent (benzene) is shaken, stirred, or kept mixed with the sample for a considerable period to extract any DDT present, and the solution thus obtained is then analyzed for its DDT content.

The lengthy and continuous agitation of numerous samples needed to insure complete solvent action entails excessive time and labor if done by hand; therefore mechanical agitators were developed. In the early period, when foliage samples were largely concerned, a shaking device was constructed. It consisted essentially of a platform activated horizontally by an eccentric on which six samples could be simultaneously kept in constant agitation for a 1-hour period of extraction.

This device served well for stripping foliage samples, but when investigations on the larvicidal action of DDT began to require analysis of large numbers of soil samples, it was found to be unsuitable. The horizontal motion allowed the heavier soil mass to pack at the bottom of the container without securing the needed constant mixture with the solvent; moreover, it was necessary to provide for a larger sample. Consequently another agitating apparatus employing a "roll-mix" principle was devised, specially adapted to soil sample needs but equally effective for foliage samples.

The essential details of this device are indicated in figure 1. It consists of a vertical plywood disk, 3 feet in diameter, mounted with its axle on a suitable support. Powered by a small electric motor (1/4 hp.) through a reducing jack to an axle pulley, the disk assembly is slowly revolved at a rate of about 10 revolutions per minute. On the face of the disk, near the edge, 10 evenly spaced holes are cut, in which the tops of 10 quart-size Mason jars can be inserted to their shoulders. To hold these jars in place two bolts are firmly fixed in the disk at either side of each jar opening, their threaded ends extending beyond the base of the jar. A plywood saddle plate tightened across each jar base by wing nuts on the bolt ends holds each jar firmly in position.

1/ J. F. Latil constructed the apparatus, C. W. Pittard prepared the working drawings, and William Breland assisted with the chemical analyses.

When jars loaded with soil and solvent are fastened in place horizontally, the slow turning of the disk keeps the contents continually mixed and moving, so that the soil is thoroughly penetrated by the extractant. Rings made of materials resistant to benzene should be substituted for the usual rubber rings.

The efficiency of this roll-mix motion in securing DDT extraction has been tested by a run of 10 soil samples, eight of these containing measured additions of DDT at the rate of 5 parts per million and the remaining two without DDT as checks. Recovery analysis of two jars each was made after 20, 40, 60, and 80 minutes of operation, the last including the checks. DDT recovery was approximately 100 percent in all cases, even after 20 minutes.

Working drawings and a list of materials for construction of this apparatus may be secured on request from the Bureau of Entomology and Plant Quarantine, Division of Domestic Plant Quarantines, Washington 25, D. C.

Figure 1.--Apparatus to facilitate extraction of DDT from soil samples.